Cellular Respiration

Biology

Summarize your understanding of each paragraph.

Cell biology studies the cell as a complete unit. It examines molecular and chemical interactions. It is concerned with the physiological properties, metabolic processes, chemical composition and interactions of the cell with their environment.

In general, cells have three main regions: a nucleus, cytoplasm, and plasma membrane. This module examines the mitochondria (*one of the several organelles in the cytoplasm*) along with aspects of the plasma membrane.

Cytoplasm is material outside the nucleus and inside the plasma membrane. It is the site of most cellular activity. Among several important organelles within the cytoplasm is the mitochondria. Mitochondria break down food and produce ATP molecules.

Plasma membrane surrounds the cytoplasm. It separates a cell from the surrounding environment. It is also called the cell membrane. It has a core of two lipid layers (fat layers). Proteins scattered in the lipid layers perform specialized functions of the membrane.

Read/Summarize Text

1. **Read the passage.**
2. **Underline key expressions in each sentence.**
3. **Re-write each word (or expression) you underlined.**
4. **Summarize the passage.**

Adenosine triphosphate (ATP)

1

2

Adenosine triphosphate (ATP) is a complex organic chemical. It provides energy required by living cells. Examples of cell processes requiring energy from ATP are muscle contraction, nerve impulse propagation, and chemical synthesis.

ATP is found in all forms of life. It is often referred to as the "molecular unit of currency" of intracellular energy transfer.

From the perspective of biochemistry, ATP is classified as a nucleoside triphosphate. ATP has three components: a nitrogenous base (adenine), a sugar ribose, and a triphosphate.

https://en.wikipedia.org/wiki/Adenosine_triphosphate

Re-write words you underlined

3

_____ _____ _____

_____ _____ _____

Using a complete sentence, summarize or rephrase the passage

4

Read Text for Comprehension

Read this article for deeper understanding. No summary is required, although you may want to circle, underline, or mark key ideas and words.

Mitochondrion Energy Conversion

An important role for the mitochondria is the production of ATP. This is done by transforming glucose into ATP and other molecules (*through redox processes*).

Redox (or, oxyidation-reduction) is a chemical reaction in which one or more electrons are transferred from one atom or molecule to another. (merriam-webster.com).

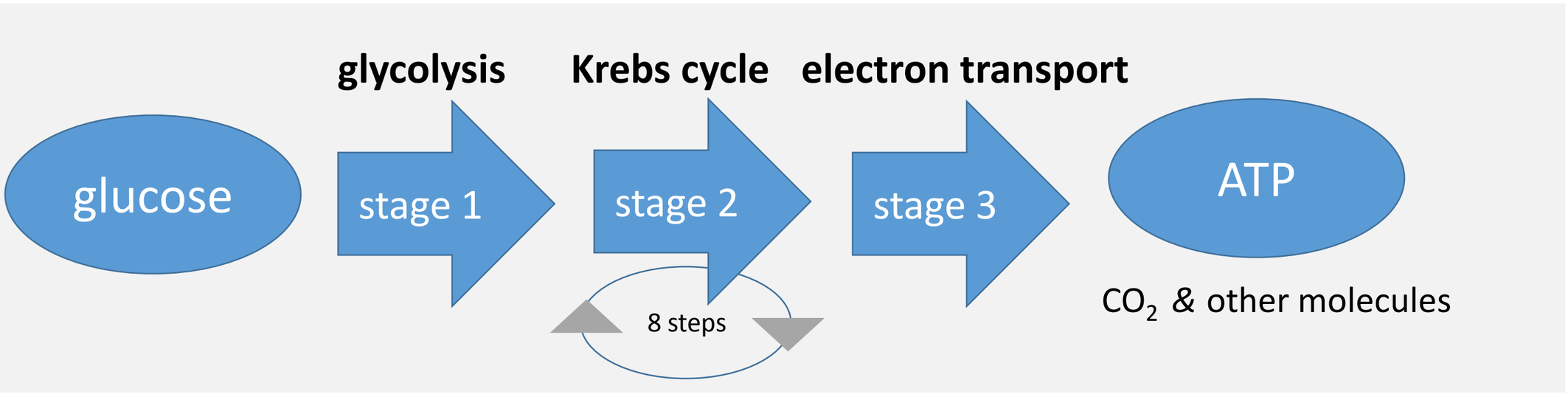
The main role of mitochondria is to produce ATP.

ATP is often referred to as “the energy currency of a cell.” ATP molecules are achieved through the cellular respiration cycle. The main reactions involved in ATP production are known as the citric acid cycle – or more commonly, the Krebs cycle. The mitochondrion performs other functions in addition to producing ATP. Still, students need to grasp the importance of ATP and ATP production.

The citric acid cycle (CAC) – also known as the Krebs cycle – is a series of chemical reactions used by all aerobic organisms to release stored energy.

The Krebs cycle has eight steps. These steps usually sound complicated the first time students encounter them in their textbook. The eight steps of the citric acid cycle are a series of redox, dehydration, hydration, and decarboxylation reactions.

Cellular respiration uses energy in glucose to make ATP. Oxygen-using (*aerobic*) respiration occurs in three stages: glycolysis, the Krebs cycle, and electron transport. A lot of chemistry happens in each of these three stages – but for the moment, become familiar with the (*highly simplified*) process shown here.



ATP. A total of 38 ATP molecules are made during the combination of the three stages of cellular respiration. Two are made during the first stage (glycolysis). Two are made during the second stage (the Krebs cycle). And about 34 are made from the third stage (electron transport system). ATP stands for adenosine triphosphate.

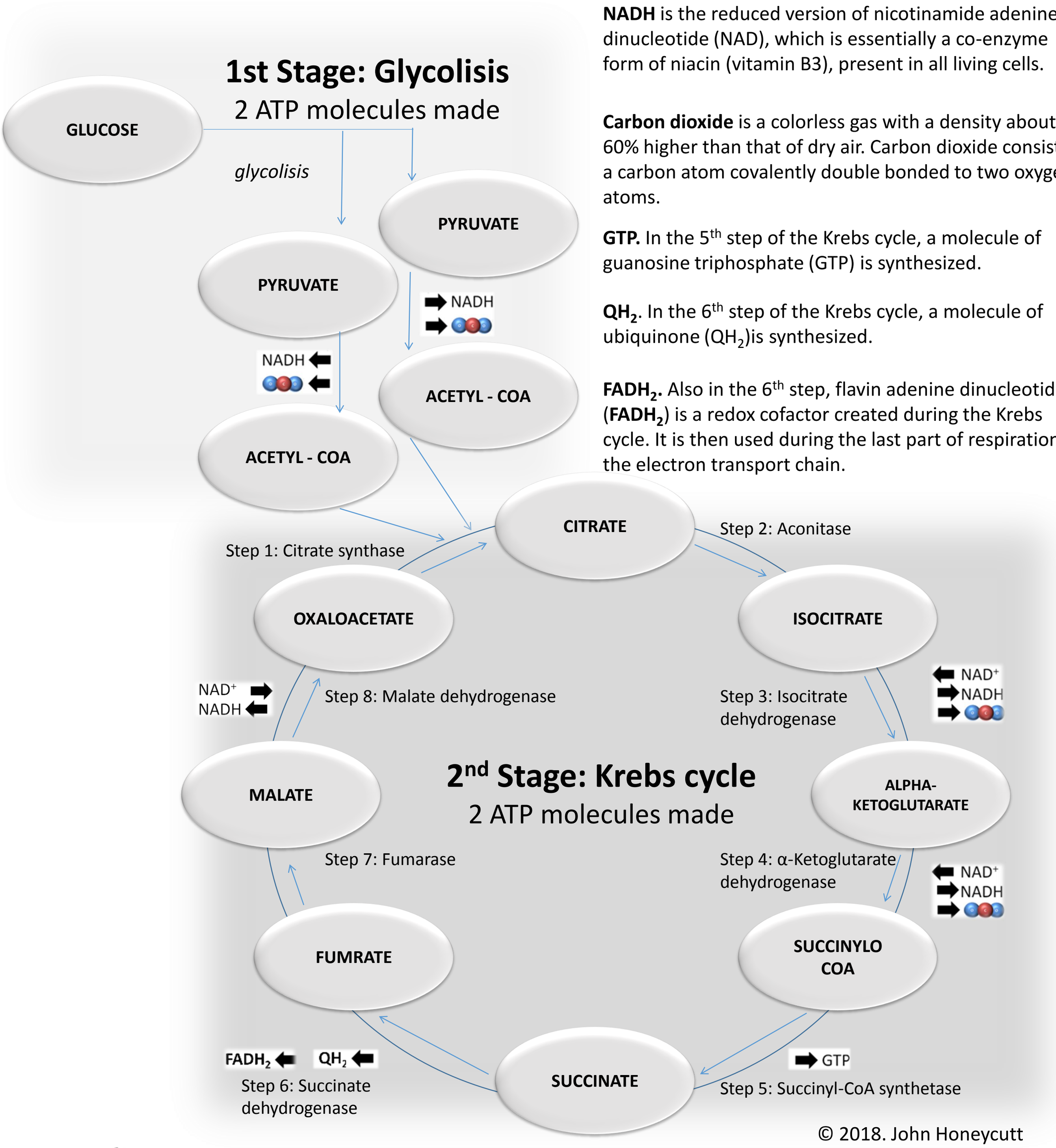
NADH is the reduced version of nicotinamide adenine dinucleotide (NAD), which is essentially a co-enzyme form of niacin (vitamin B3), present in all living cells.

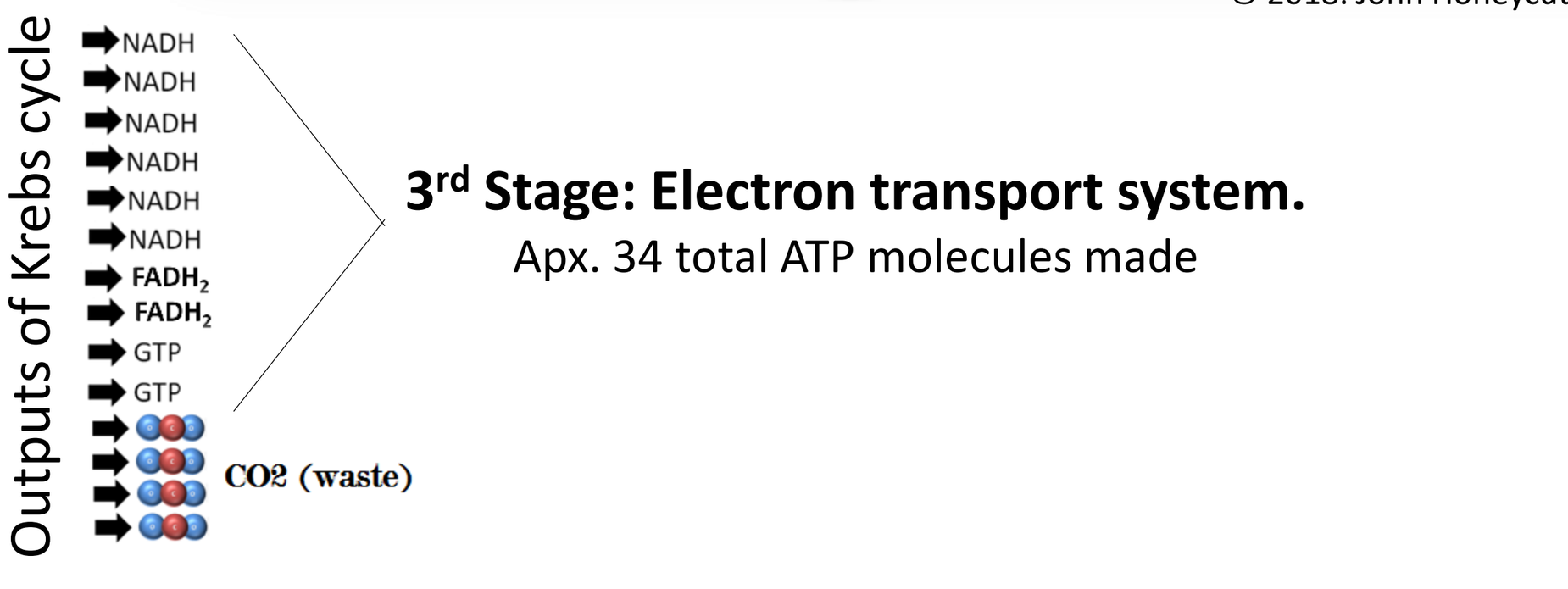
Carbon dioxide is a colorless gas with a density about 60% higher than that of dry air. Carbon dioxide consists of a carbon atom covalently double bonded to two oxygen atoms.

GTP. In the 5th step of the Krebs cycle, a molecule of guanosine triphosphate (GTP) is synthesized.

QH_2. In the 6th step of the Krebs cycle, a molecule of ubiquinone (QH_2)is synthesized.

$FADH_2$. Also in the 6th step, flavin adenine dinucleotide (**$FADH_2$**) is a redox cofactor created during the Krebs cycle. It is then used during the last part of respiration, the electron transport chain.

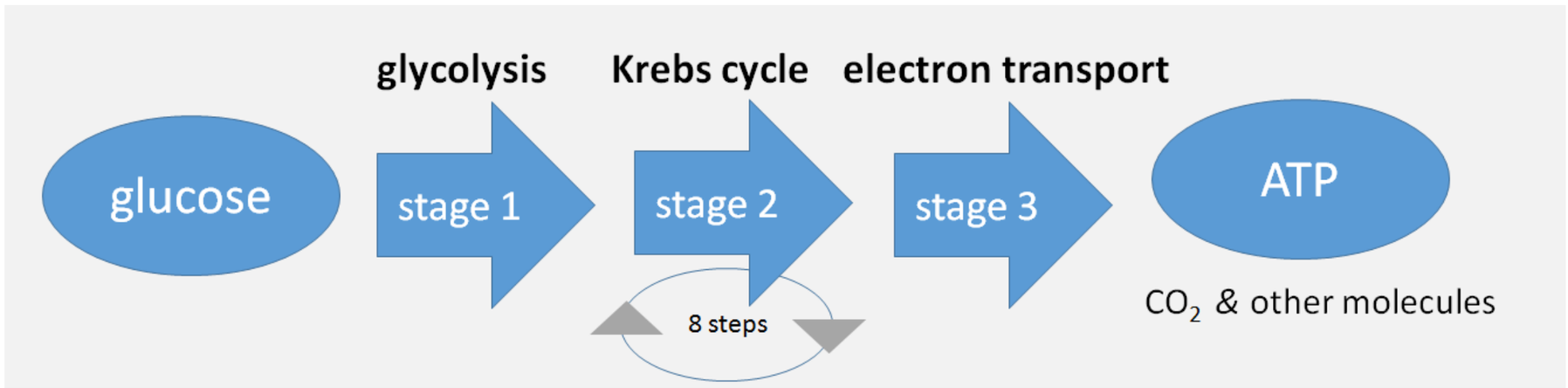




Draw Illustration

Copy and Label the Illustration in the Space Provided

Illustration



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